

Pests Won't Concede: Here's How We Deal

In a perfect world, people and pests would come to a gentleman's agreement: We'd let them eat our lawn clippings and they'd leave our crops alone. But in the real world, insects ravage a gardener's vegetable plot, and the gardener can only get mad instead of even... and a wheat farmer can only go out of business when rust turns a field brown.

The backyard grower and the thousand-acre wheat farmer may operate on different scales, but both share the same stake in their crops—harvest equals success.

They also share concerns about stewardship of their environment, be it a small plot or a quarter of a county. And therein lies the quandary: Can pest control be balanced against environmental tolerances in a way that's cost effective?

Fortunately, we've got a concept that offers something for everyone—integrated pest management, or IPM.

What are we saying when we promote a strategy that begins with the word "integrated"? We're talking about the advantages of using several different pest controls at once, teaming them together into interlocking regimens. For example, a no-till cropping system for growing corn can be tailored to require only low amounts of insecticide, assuming that the corn earworm's presence is monitored with insect traps. Advantages: organic matter added to soil, less soil erosion and chemical runoff into groundwater, and minimal crop loss to intermittent pests.

The term "pest management" draws a distinction between today's point of view and the once-prevalent notion of "pest eradication." Today, even if it were possible to completely

eradicate all pest species, most producers wouldn't choose this strategy.

To *manage* insects, weeds, and organisms that cause plant diseases rather than to obliterate them is to take a different view of agriculture, not as conqueror of nature but rather as a controlled subset of its surrounding environment. IPM practices are founded on sensitivity to natural patterns and supported by a wealth of data that describes the interactions of pests, host species, and environment.

Biological control is perhaps the most familiar component of IPM. By pitting natural enemies against pest species, we have enlisted a vast army of mercenaries to fight our fight.

Another fascinating and effective biologically based method is to disrupt insect mating by using simulated sex pheromones. Give them a heavy enough jolt of pheromones, and insects like the pepper weevil find themselves too dazed to dally.

Yet a third biologically based method, first used against the screw-worm with resounding success, is to release sexually sterile males into a breeding population, thus winnowing out the next generation of offspring.

Remember, though: Biological control and related strategies are far from the whole show. IPM also includes improvement of plant varieties like those we're breeding to resist the Russian wheat aphid, and application of new cropping systems to remedy agriculture's oldest problems. And IPM research requires a solid grounding in the basics: for example, gene mapping offers us a structural framework for inheritance of improved crop traits such as insect resistance.

IPM also favors knowledge-driven chemical applications that target specific insects, weed species, and disease-causing organisms with minimal amounts of pesticides—precisely at the point in their life

cycles when scientists have shown them to be most vulnerable.

Application technology plays an important role. ARS innovations like sprayer nozzles that reduce droplet size and rope applicators that barely graze weeds with herbicide allow growers to make the most of small chemical quantities.

There are also human variables. With a spirit of areawide cooperation, IPM can achieve its most notable results. Today, for the first time in three generations, cotton growers in the Carolinas can honestly say they fear no weevil, thanks to an IPM program that's driven the boll weevil out of the region. And fruit growers in the Pacific Northwest, concerned about apple codling moth's growing resistance to insecticides, have recently joined together in an area-wide pest management initiative. In both cases, informed participation and coordinated management have improved the odds against insect populations.

Coming up with holistic strategies has in turn influenced the way scientists work. IPM has increased communication across disciplines and has created a notable demand for collaboration among, for example, chemists, plant physiologists, and entomologists in federal, state, and private sectors.

To policymakers concerned with preserving American agriculture's productivity but wishing to avert resource degradation, the IPM approach spells out a rational course of action. USDA's national IPM initiative, established in 1994, intends to help producers use IPM on 75 percent of U.S. cropland by the year 2000.

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